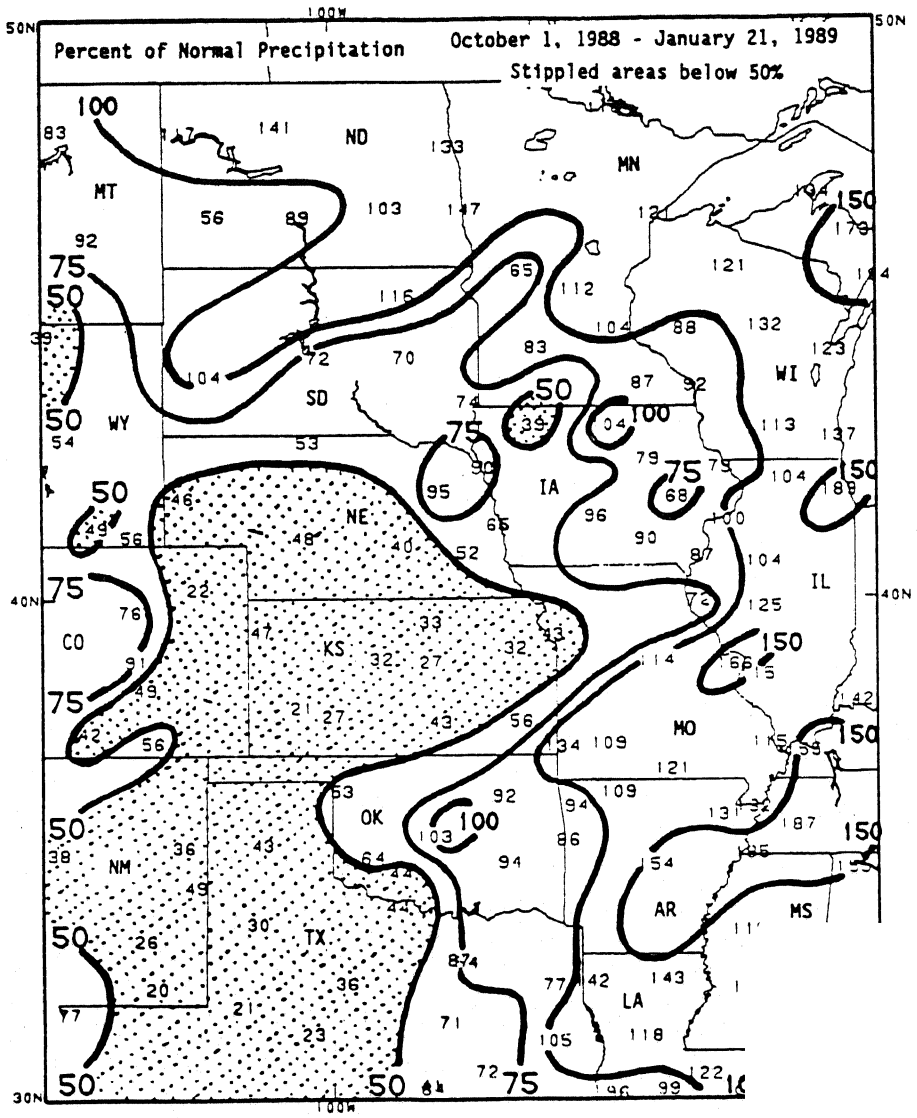
CLIMATE ANALYSIS CENTER

CONTAINS: 1988 GLOBAL CLIMATE REVIEW AND 1988 WEEKLY CLIMATE BULLETIN INDEX

WEEKLY CLIMATE BULLETIN

No. 89/03 Washington, DC January 21, 1989



DURING THE PAST THREE AND ONE-HALF MONTHS, MUCH OF THE CENTRAL AND SOUTHERN GREAT PLAINS HAVE EXPERIENCED EXTREMELY DRY WEATHER. SINCE OCTOBER 1, 1988, ONLY 1 TO 2 INCHES OF PRECIPITATION HAS FALLEN ON THE REGION AS DEFICITS HAVE ACCUMULATED UP TO 4.4 INCHES IN EASTERN KANSAS. THE 1 CLIMAT T

UNITED STATES DEPAR

WEEKLY CLIMATE BULLETIN

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This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief, concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

Highlights of major global climatic events and anomalies.
U.S. climatic conditions for the previous week.
U.S. apparent temperatures (summer) or wind chill (winter).
Global two-week temperature anomalies.
Global four-week precipitation anomalies.
Global monthly temperature and precipitation anomalies.
Global three-month precipitation anomalies (once a month).
Global twelve-month precipitation anomalies (every 3 months).
Global temperature anomalies for winter and summer seasons.
Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Center via the Global Telecommunication System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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NOAA, National Weather Service
Washington, DC 20233
Phone: (301) 763-8071

GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JANUARY 21, 1989

[Approximate duration of anomalies is in brackets]

1. Alaska and Northwestern Canada:

ABNORMALLY MILD WEATHER ENDS.

Temperatures plummeted to as much as 23.5°C (45.9°F) below normal as the mild regime was replaced by bitter cold [Ended at 5 weeks].

2. Southwestern United States:

COLD CONDITIONS EASE.

Temperatures moderated last week; however, some mountain valleys reported temperatures approaching 9.4°C (16.9°F) below normal [Ending at 4 weeks].

3. Uruguay and Northern Argentina:

AREA STILL DRY.

Precipitation was generally less than 13.5 mm (0.53 inches) as dryness persisted [30 weeks]. Temperatures returned to near normal across most of the region [Ended at 8 weeks].

4. Italy:

DRYNESS CONTINUES.

Little or no precipitation fell in northern and central Italy as a dry spell continued [9 weeks].

5. Greece, Turkey, and the Middle East:

TEMPERATURES MODERATE.

Milder conditions spread across most of the region; however, temperatures were as much as 4.5°C (8.1°F) below normal in some parts of Turkey [Ending at 6 weeks].

6. South Central Siberia:

MILD CONDITIONS LINGER.

The mild weather regime, with temperatures reaching 10.7°C (19.3°F) above normal, persisted in the region east of Lake Baykal [15 weeks].

7. Northwestern India:

UNUSUALLY COLD WEATHER OCCURS.

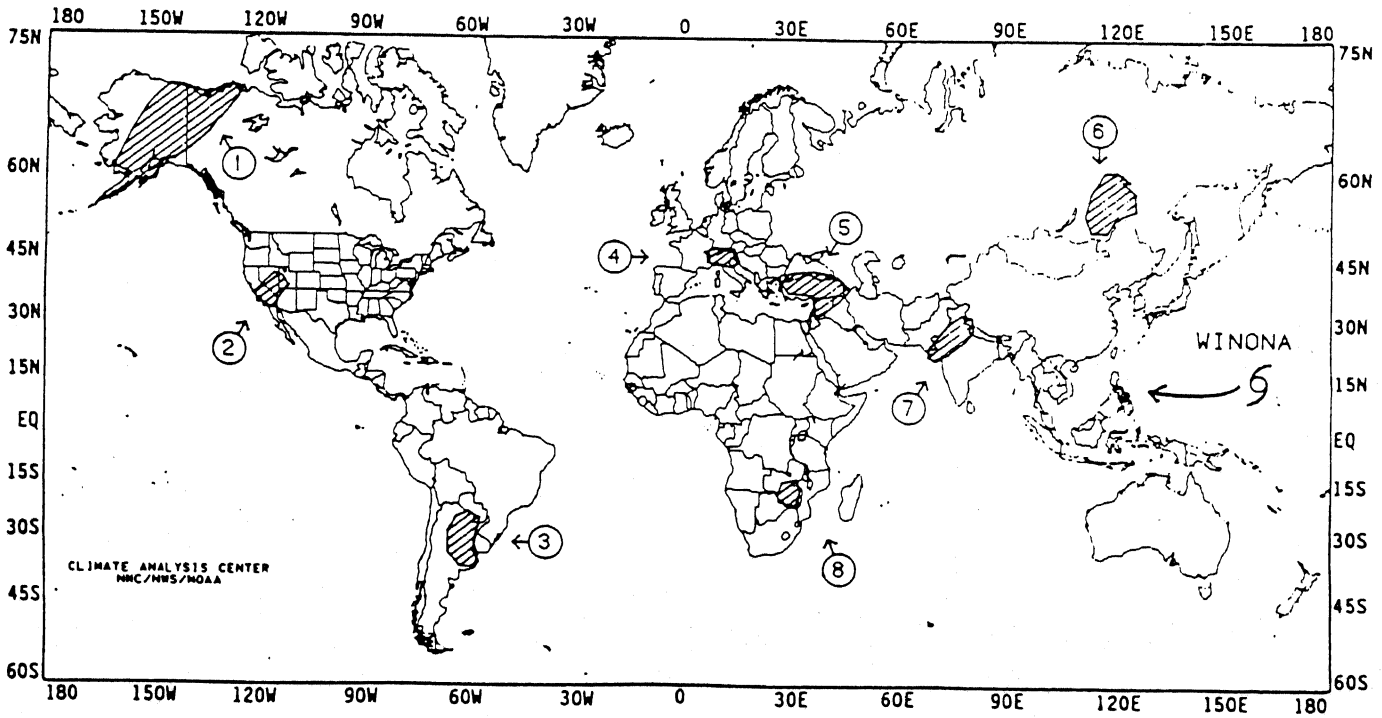
Temperatures reached 4.7°C (8.5°F) below normal as abnormally cold conditions prevailed [2 weeks].

8. Zimbabwe:

DRY SPELL DEVELOPS.

Little or no precipitation fell in Zimbabwe as very dry conditions developed [7 weeks].

(NOTE: Text precipitation amounts and temperature departures are this week's values).



Approximate locations of the major anomalies and events described above are shown on this map. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, longer term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JANUARY 15 THROUGH JANUARY 21, 1989.

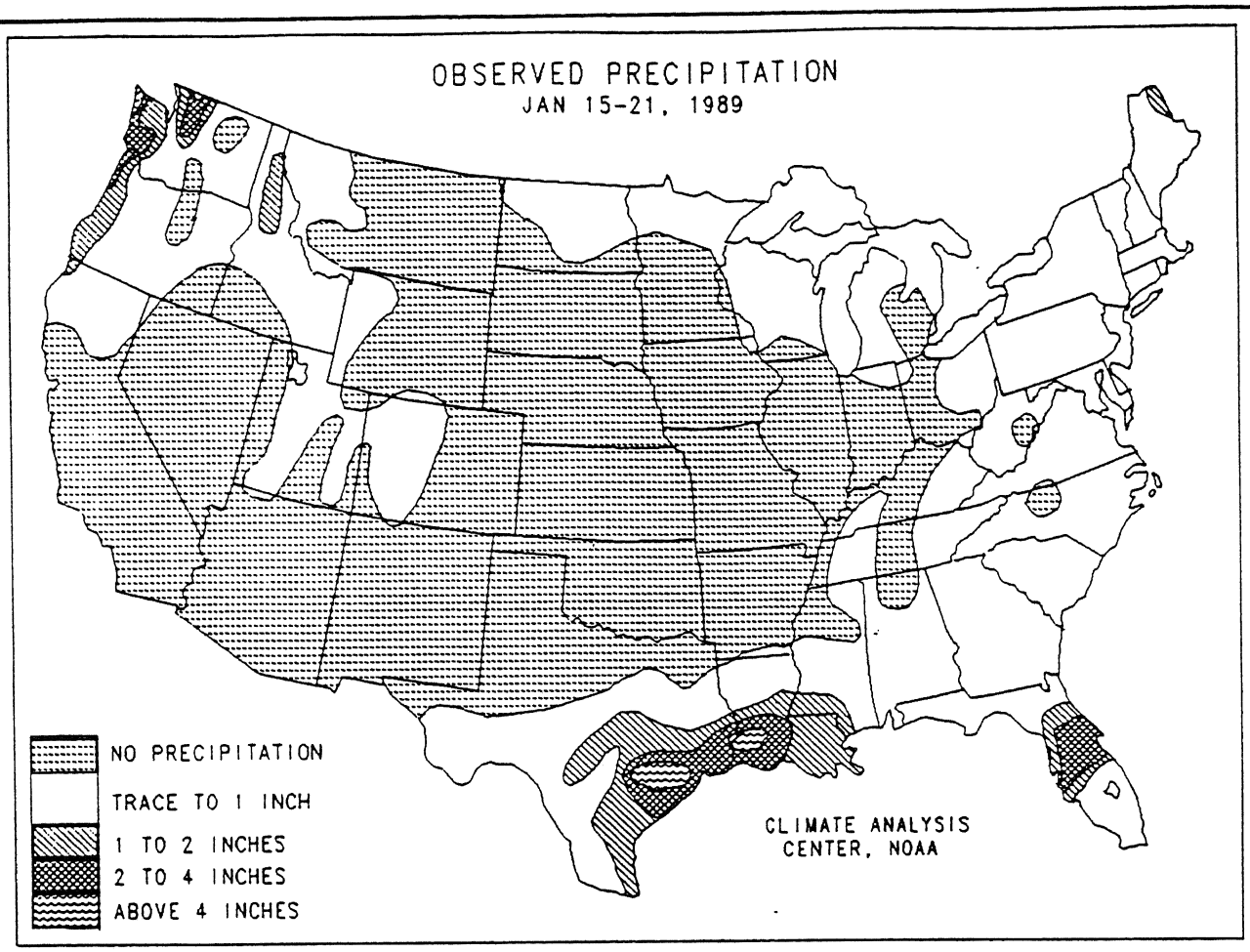
Much of the nation experienced mild and dry conditions with the exception of the northwestern and southeastern corners of the contiguous United States. With the storm track remaining well north of its normal January position, wintery weather was confined to the northern tier of states and in Alaska. Early in the week, winds up to 90 mph hit Choteau, MT, with lesser gusts reported in the northern High Plains region. Subzero temperatures and strong winds produced dangerous wind chills (below -45°F) in parts of northern New England.

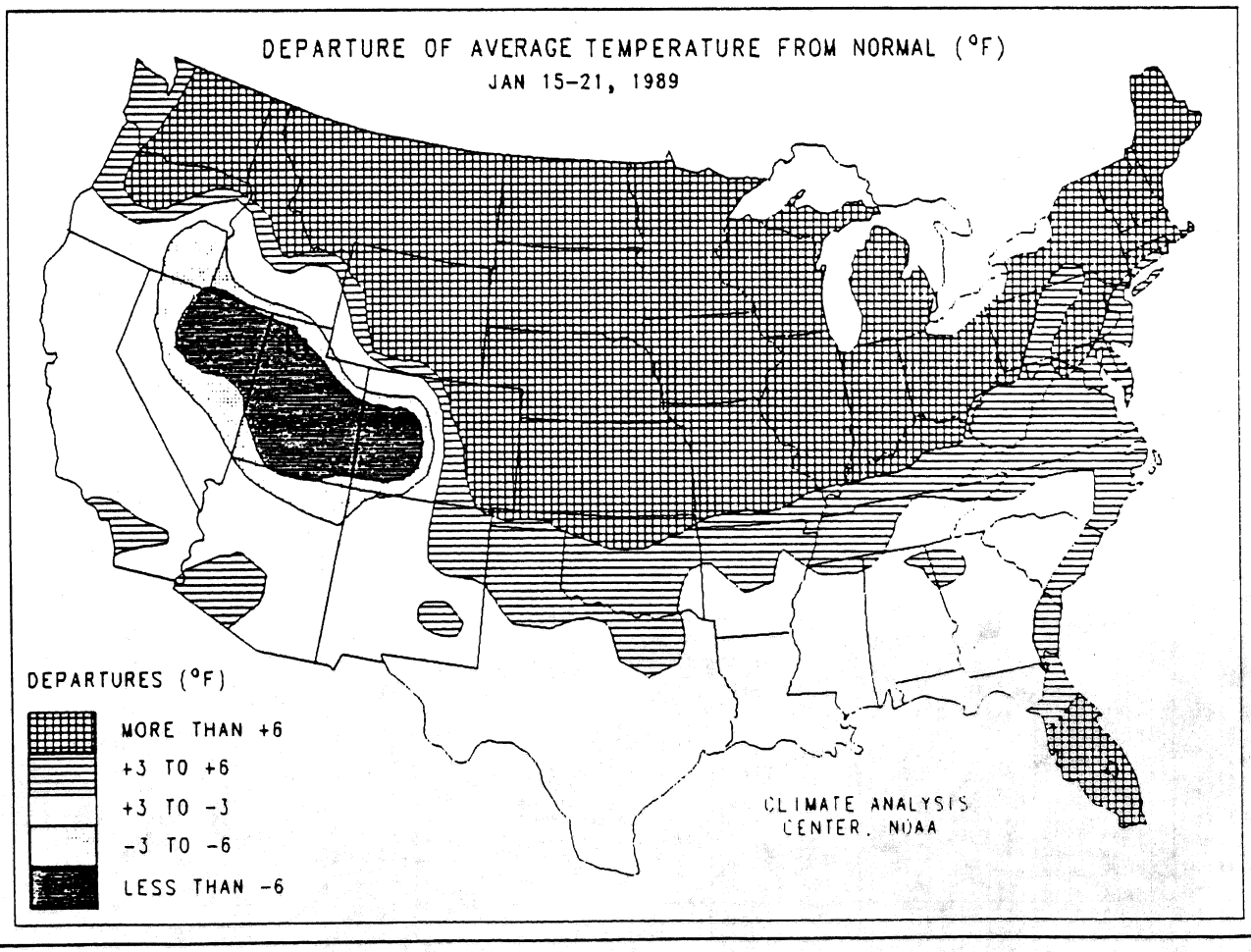
According to the River Forecast Centers, between 1 and 3 inches of precipitation was measured along the Pacific Northwest Coast, with up to 6 inches at Quillayute, WA. Heavy snows fell further inland on sections of the Cascades and the Rockies in northern Idaho and western Montana. Farther east, a stationary front produced heavy rains (up to 5.2 inches) in southern Louisiana and southeastern Texas and provided some relief from unusually dry conditions in the latter region (see Table 1). Similar to southeastern Texas, central and southern Florida, relatively dry during the past seven weeks, received moderate to heavy rains (6.2 inches near Cape Canaveral, FL) in association with a developing low pressure center in the eastern Gulf of Mexico. In Alaska, moderate to heavy precipitation was limited to stations along the extreme southeastern coast, while torrential rains deluged Hilo, HI with more than 7.5 inches. Light to moderate amounts were reported in most of the Pacific Northwest, the northern Rockies, the extreme northern and southern Great Plains, the northern and eastern Great Lakes, in much of New England, and along the Gulf and Atlantic Coasts. Little or no precipitation was observed in the southern halves of the Pacific Coast and Intermountain West, in most of the Rockies, the central Great Plains, the Missouri, middle and lower Mississippi, Tennessee, and Ohio Valleys, and sections of the Appalachians.

Normally, mid to late January is the coldest time of the year, but last week's temperatures were up to 22°F above normal as unseasonably mild weather prevailed across much of the lower 48 states. The greatest positive departures (between +15° and +22°F) were found from central Montana southeastward to central Iowa (see Table 2). A blast of cold Arctic air towards the end of the week helped to moderate weekly departures in the eastern half of the country, but temperatures still averaged between 4° and 10°F above normal. Before the frontal passage, readings in the sixties were recorded as far north as Maryland, Missouri, and South Dakota (see Figure 1). In sharp contrast, bitterly cold weather invaded most of Alaska as lows plummeted below -40°F (-60°F at Bettles and Nenana, AK) and temperatures averaged as much as 42°F below normal (see Table 3). Fairbanks recorded a high of -41°F on Jan. 18, while Anchorage's Jan. 19 low of -24°F was its coldest reading since 1975. Farther south, subnormal temperatures persisted in the Great Basin and central Rockies as snow cover, clear skies, and low winds dropped readings below zero. Temperatures in southwestern Texas and along the western half of the Gulf Coast were slightly below normal.

TABLE 1. Selected stations with more than two inches of precipitation for the week.

Station	Amount(In)	Station	Amount(In)
Hilo/Lyman, Hawaii, HI	7.60	Galveston, TX	2.83
Quillayute, WA	6.14	Port Arthur, TX	2.72
Houston/Ellington AFB, TX	4.32	Lafayette, LA	2.43
Houston/William Hobby, TX	3.77	Astoria, OR	2.36
Annette Island, AK	3.63	New Orleans NAS, LA	2.29
Cape Canaveral AFS, FL	3.11	Victoria, TX	2.22
Mt. Washington, NH	3.07	Orlando, FL	2.09
Lake Charles, LA	2.92	Ketchikan, AK	2.07
Palacios, TX	2.87	Adak, AK	2.04


OBSERVED PRECIPITATION
JAN 15-21, 1989
NO PRECIPITATION
TRACE TO 1 INCH
1 TO 2 INCHES
2 TO 4 INCHES
ABOVE 4 INCHES
CLIMATE ANALYSIS
CENTER, NOAA


DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)
JAN 15-21, 1989
DEPARTURES (°F)
MORE THAN +6
+3 TO +6
+3 TO -3
-3 TO -6
LESS THAN -6
CLIMATE ANALYSIS
CENTER, NOAA

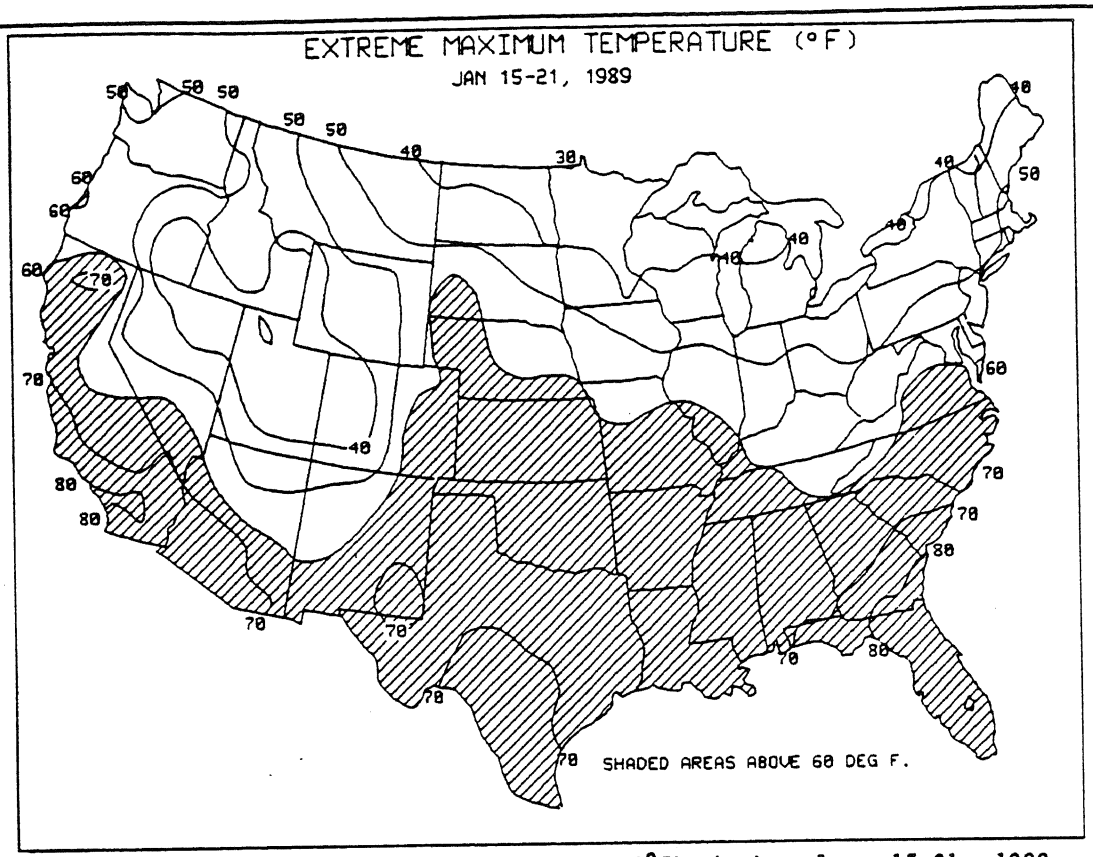


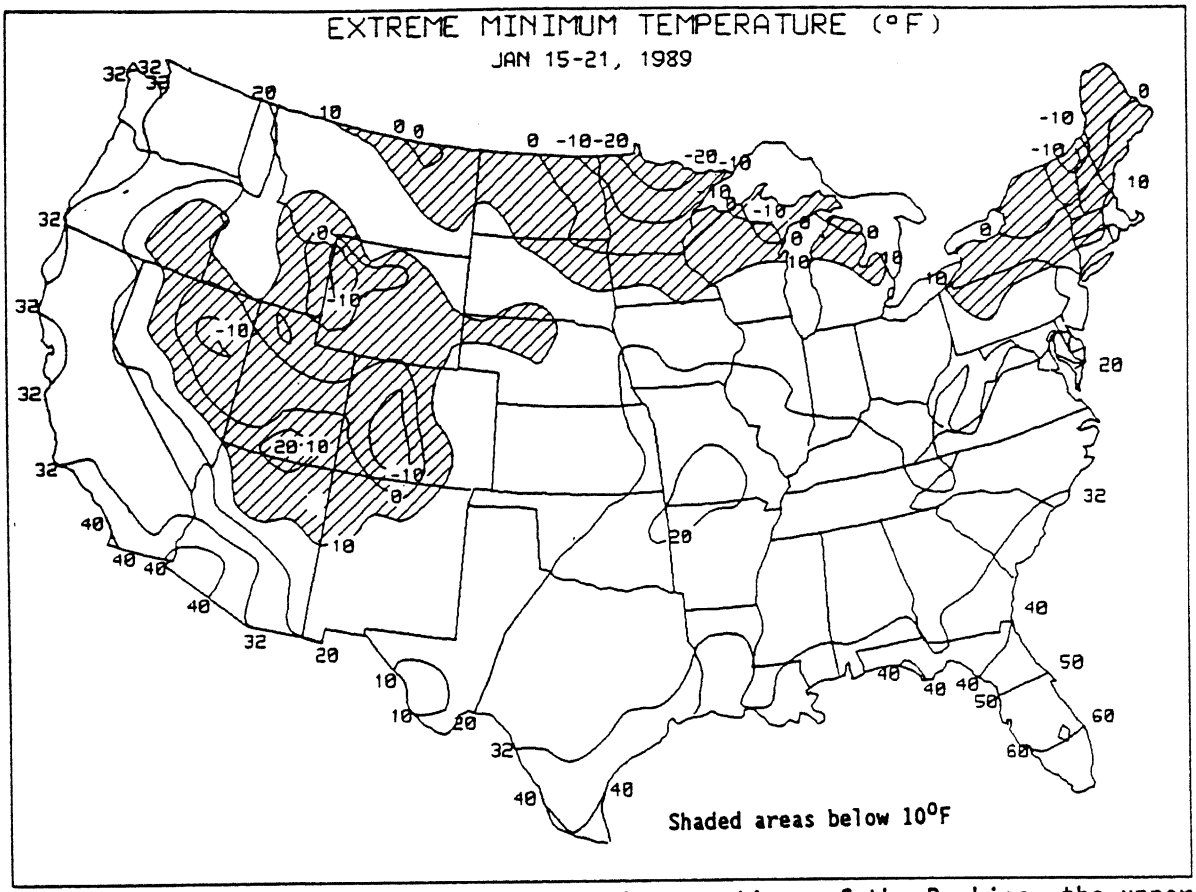
Figure 1. Extreme maximum temperatures (°F) during Jan. 15-21, 1989. Unseasonably mild weather covered most of the lower 48 states as highs in the sixties reached as far north as South Dakota, Illinois, and Maryland.

TABLE 2. Selected stations with temperatures averaging more than 13.0°F ABOVE normal for the week.

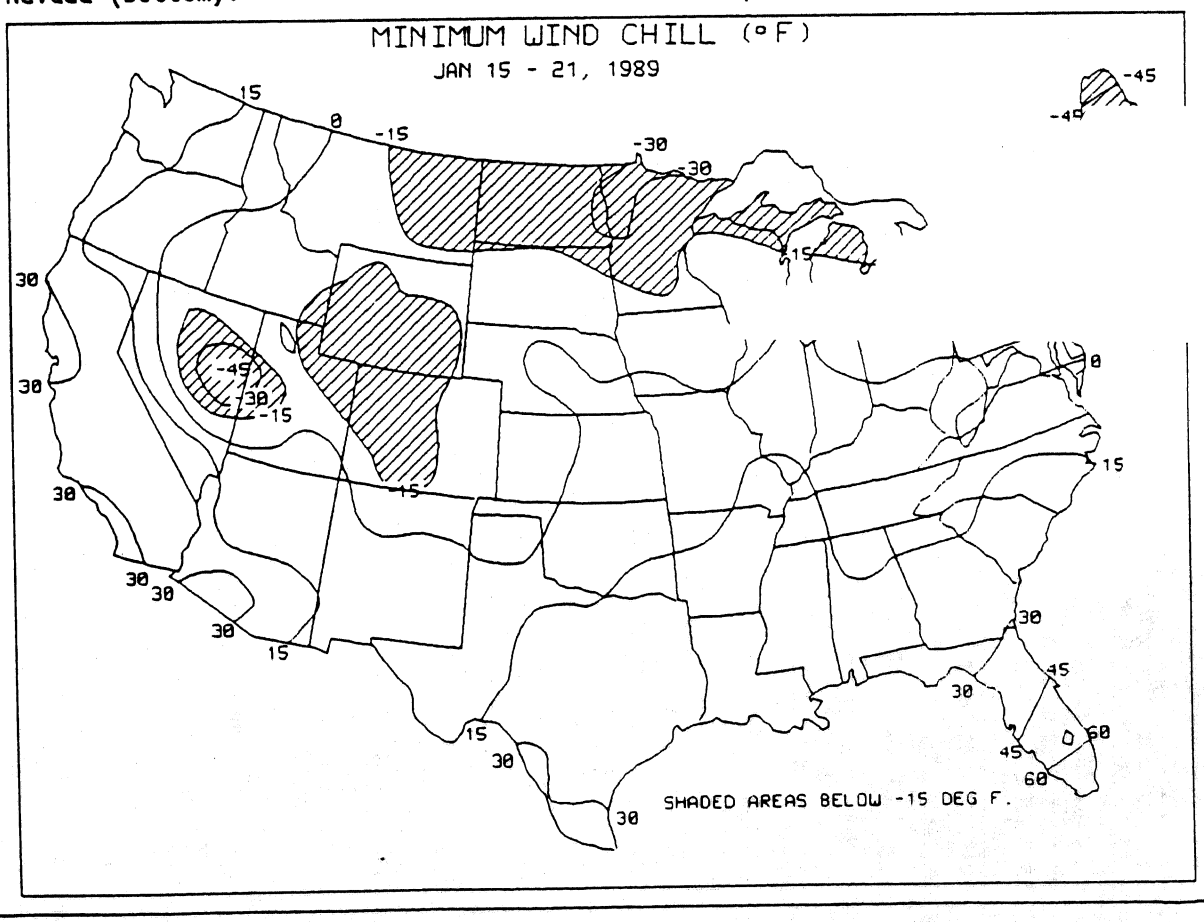
Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Havre, MT	+21.5	32.9	Grand Island, NE	+16.3	36.6
Bismarck, ND	+20.8	26.8	Miles City, MT	+16.1	29.6
Huron, SD	+20.0	30.6	Bozeman, MT	+16.0	31.4
Cut Bank, MT	+19.8	33.7	Aberdeen, SD	+16.0	23.3
Sioux City, IA	+19.7	35.5	Waterloo, IA	+15.8	29.5
Great Falls, MT	+19.5	38.5	Valentine, NE	+15.6	33.4
Helena, MT	+19.3	37.3	Rochester, MN	+15.6	24.6
Sioux Falls, SD	+19.2	31.1	Sheridan, WY	+15.4	34.9
Norfolk, NE	+19.1	36.2	Concordia, KS	+15.3	40.4
Dickinson, ND	+19.0	29.3	Kalispell, MT	+14.3	33.6
[illegible]estown, ND	+19.0	23.6	Minneapolis, MN	+14.3	24.7
[illegible]icer, IA	+18.9	31.0	Madison, WI	+14.1	29.5
[illegible], ND	+18.4	23.9	La Crosse, WI	+14.1	27.9
[illegible]in, NE	+18.3	37.4	Cedar Rapids, IA	+13.9	31.9
Omaha, NE	+17.8	37.6	Eau Claire, WI	+13.8	23.0
[illegible]ow, MT	+17.7	25.4	St. Louis, MO	+13.6	42.1
[illegible]ston, ND	+17.6	24.1	Quincy, IL	+13.6	36.6
[illegible]oines, IA	+17.5	35.6	Butte, MT	+13.5	28.6
[illegible]wa, IA	+17.3	36.7	Alexandria, MN	+13.5	18.3
[illegible]d City, SD	+17.1	37.7	Moline, IL	+13.4	32.7
[illegible]	[illegible]	37.7	Fargo, ND	+13.2	16.9
		31.5	Green Bay, WI	+13.1	26.8
		28.9	St. Cloud, MN	+13.1	19.7

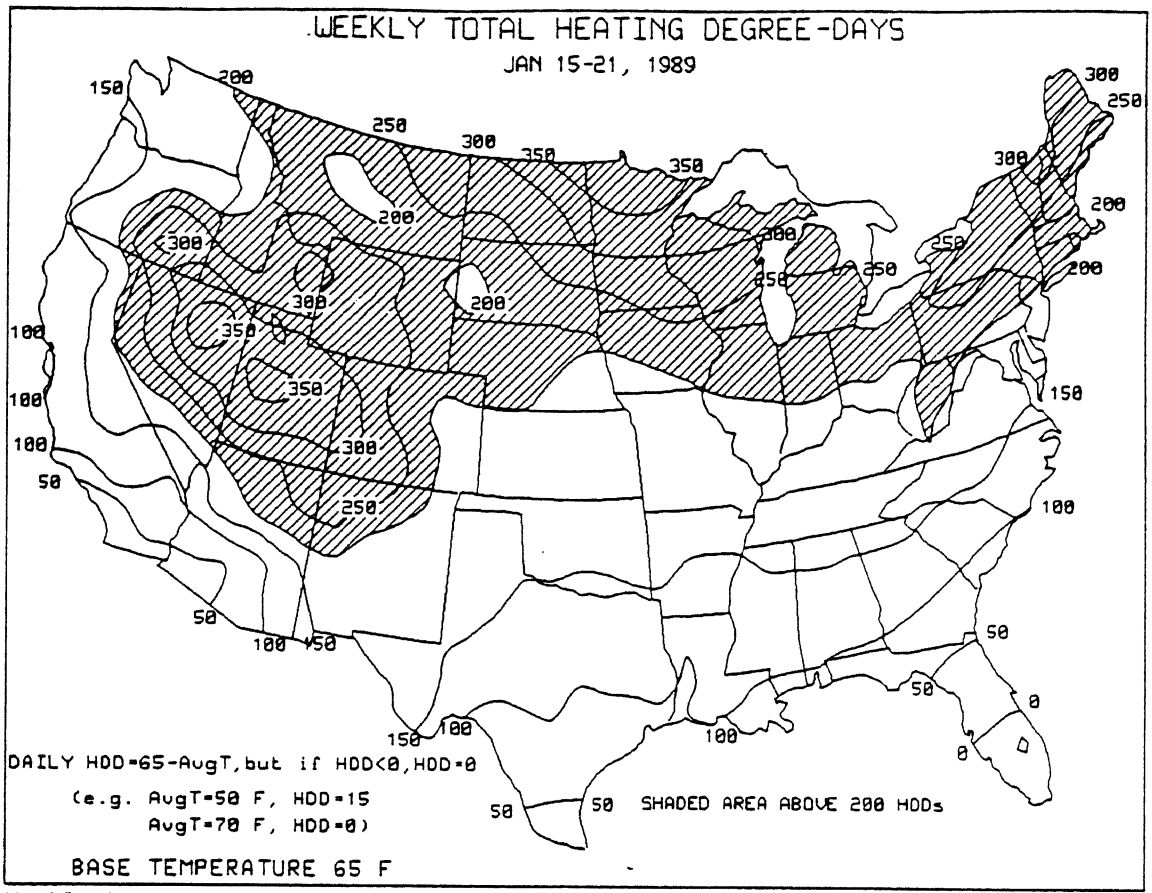
[illegible]emperatures averaging more than 5.0°F BELOW normal for the week.

Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Bettles, AK	-42.3	-53.2	Homer, AK	-19.2	1.9
Aniak, AK	-36.4	-36.9	Elko, NV	-17.0	7.9
Nome, AK	-34.6	-28.5	Delta, UT	-14.7	11.6
Kotzebue, AK	-33.4	-36.0	Cordova/Mile 13, AK	-14.1	7.3
Bethel, AK	-33.2	-27.9	Northway, AK	-10.7	-32.3
Illiamna, AK	-31.2	-16.7	Gulkana, AK	- 9.6	-18.2
Talkeetna, AK	-31.0	-22.2	Cedar City, UT	- 8.7	20.9
King Salmon, AK	-30.1	-17.2	Salt Lake City, UT	- 8.5	20.1
Kenai, AK	-29.7	-19.6	Cold Bay, AK	- 7.6	20.8
Unalakleet, AK	-29.3	-26.4	Grand Junction, CO	- 7.2	18.3
Big Delta, AK	-26.2	-32.3	Winnemucca, NV	- 6.0	24.0
Fairbanks, AK	-22.8	-34.9	Valdez, AK	- 5.2	12.7
Barrow, AK	-20.6	-34.8	Burns, OR	- 5.1	22.4
Anchorage, AK	-20.1	-7.9			

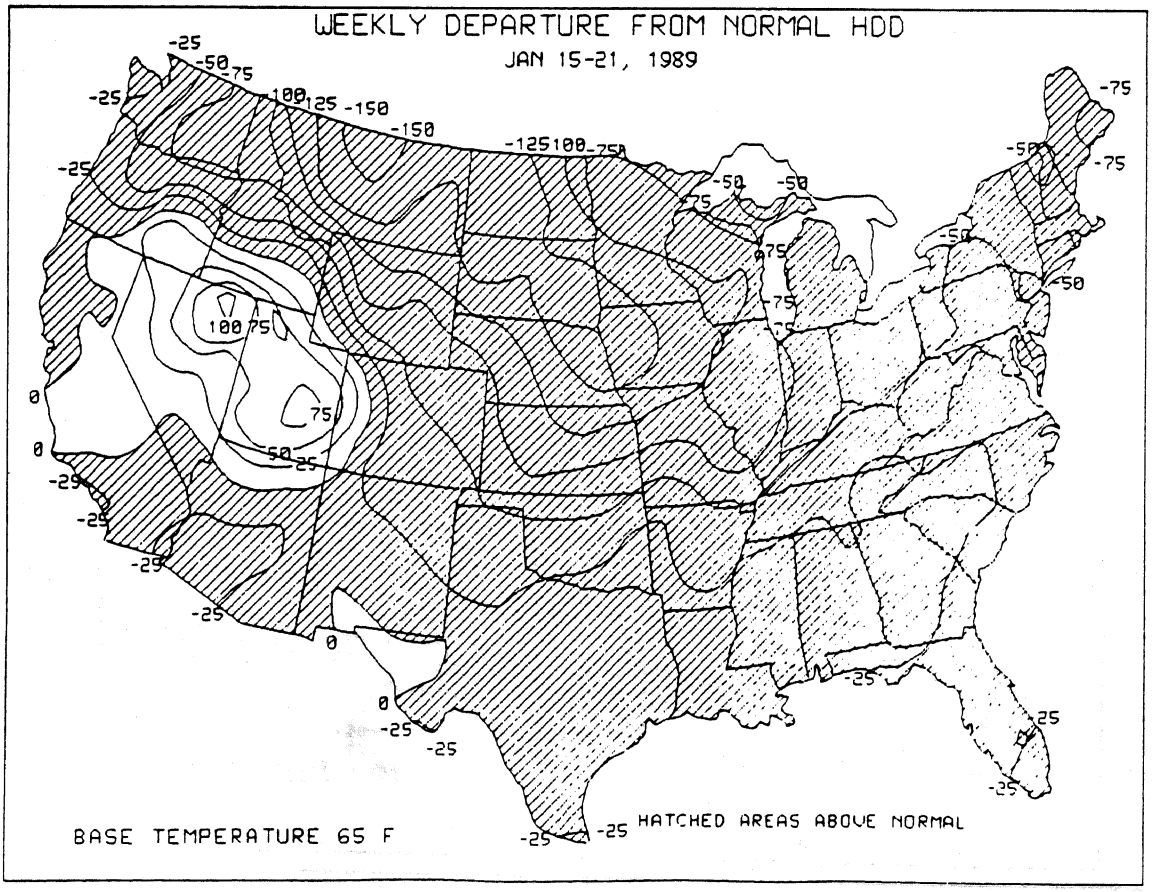


Mild weather kept subzero readings limited to portions of the Rockies, the upper Midwest, and northern New England (top). After two consecutive weeks with wind chills less than -60°F, much above normal temperatures kept wind chills greater than -30°F with the exception of northern New England and parts of Minnesota and Nevada (bottom).



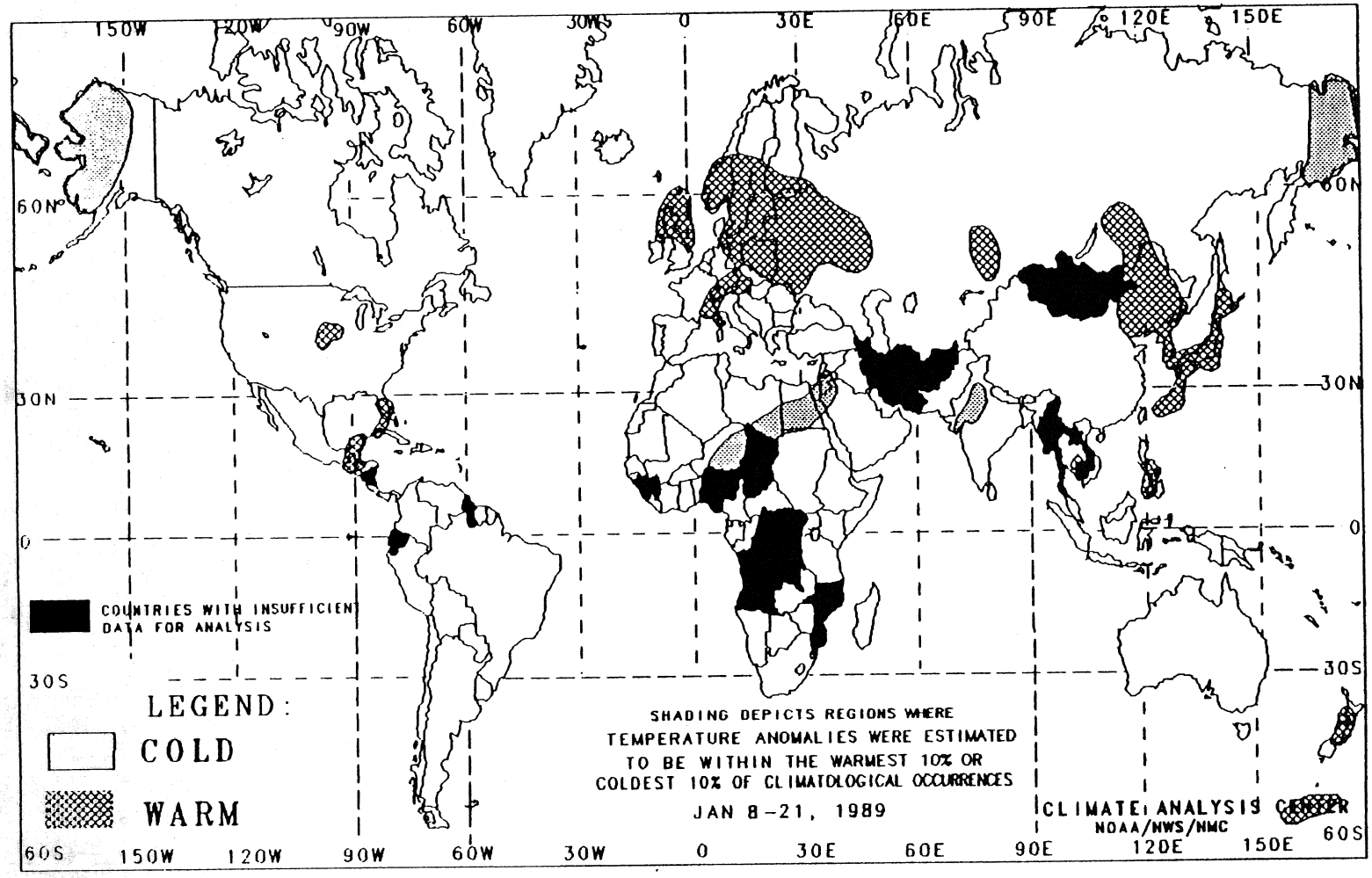


Weekly heating usage was much less than previous weeks in the northern tier of states as abnormally mild conditions kept total HDD's under 350 except for northern Minnesota and parts of the Rockies (top). With above normal temperatures across a vast majority of the lower 48 states, weekly heating demand was much less than normal, especially in the northern Rockies and Great Plains where demand was only 50-75% of normal (bottom).



GLOBAL TEMPERATURE ANOMALIES

2 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

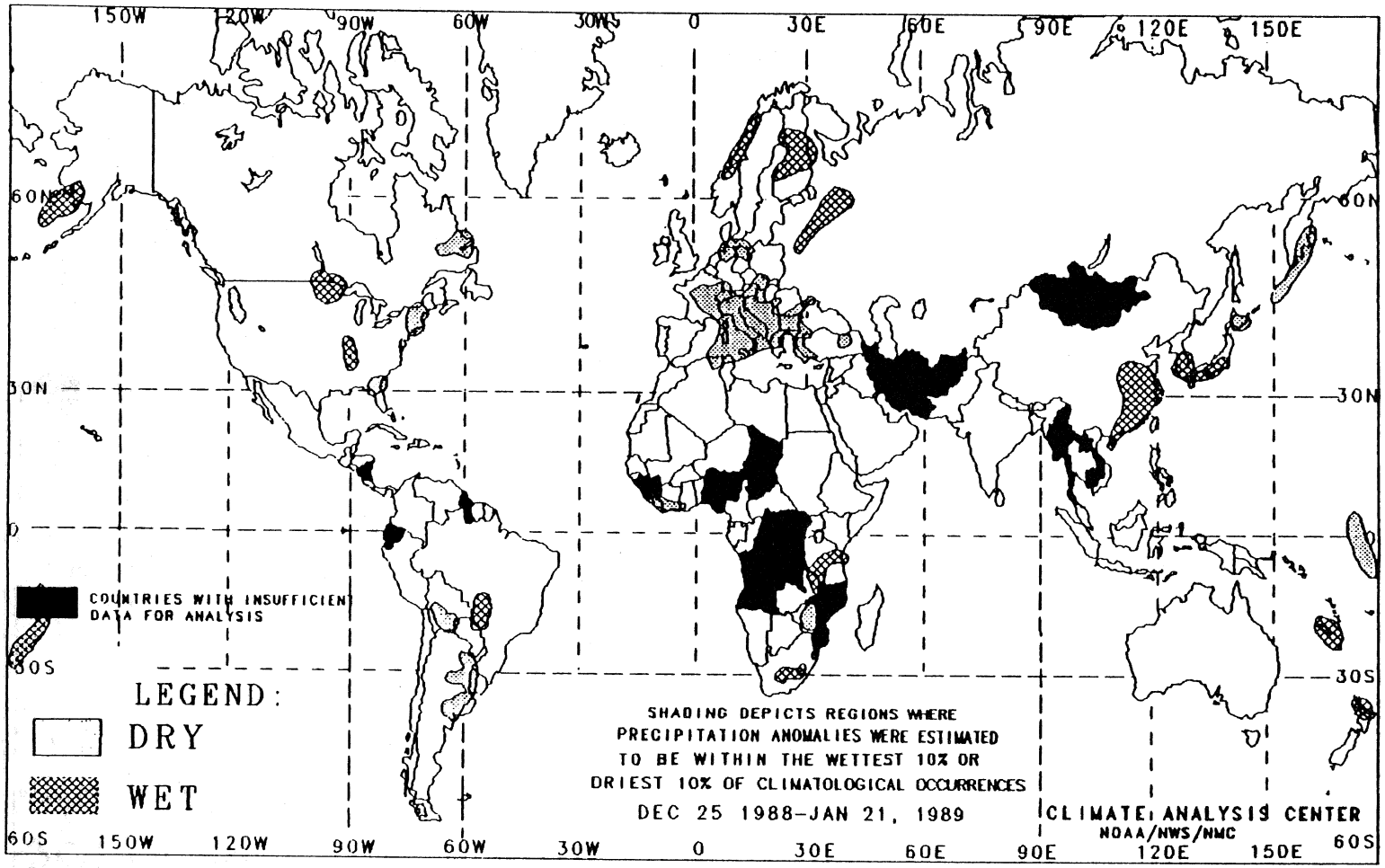
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining precentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

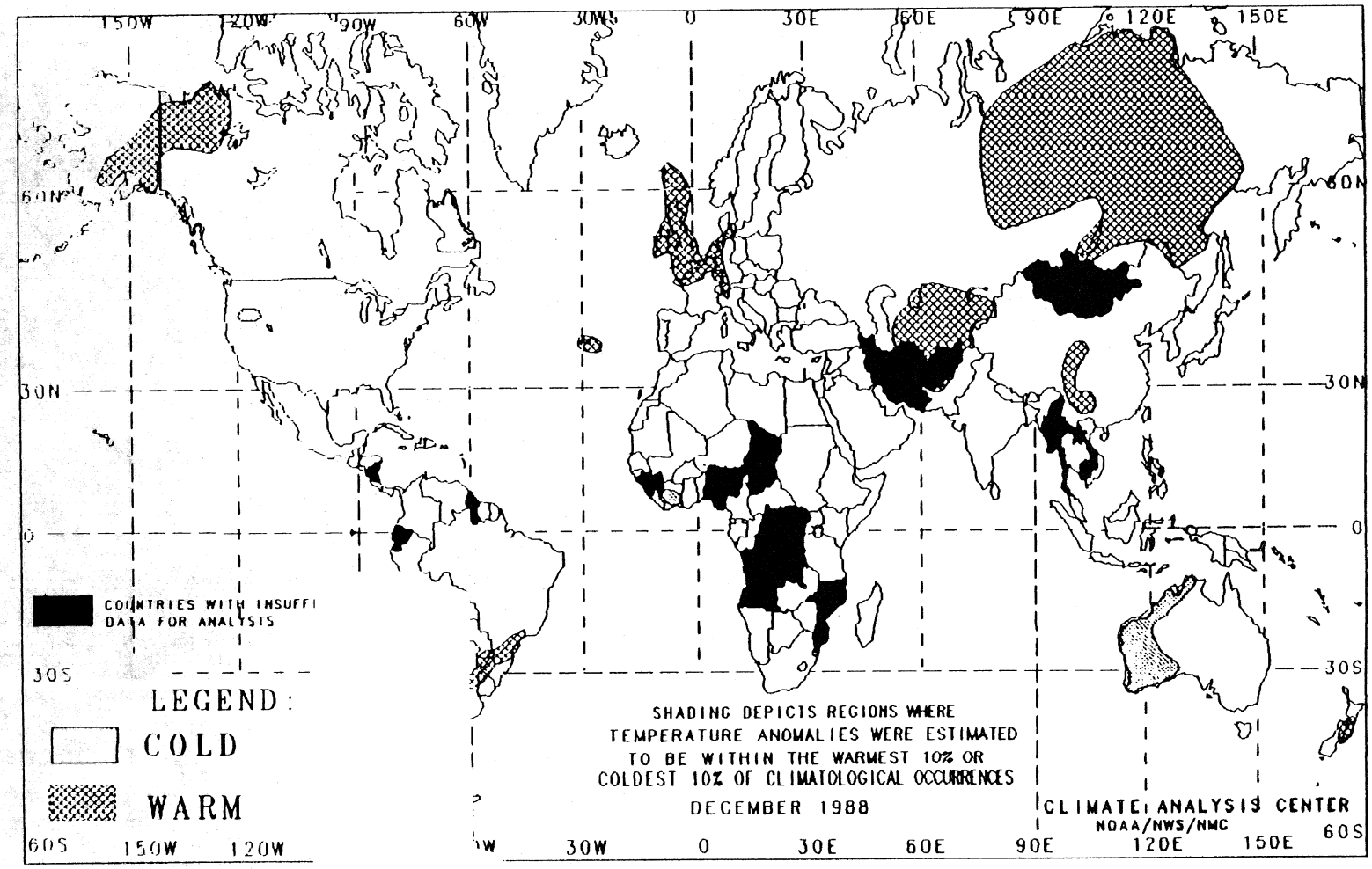
In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL TEMPERATURE ANOMALIES

1 Month



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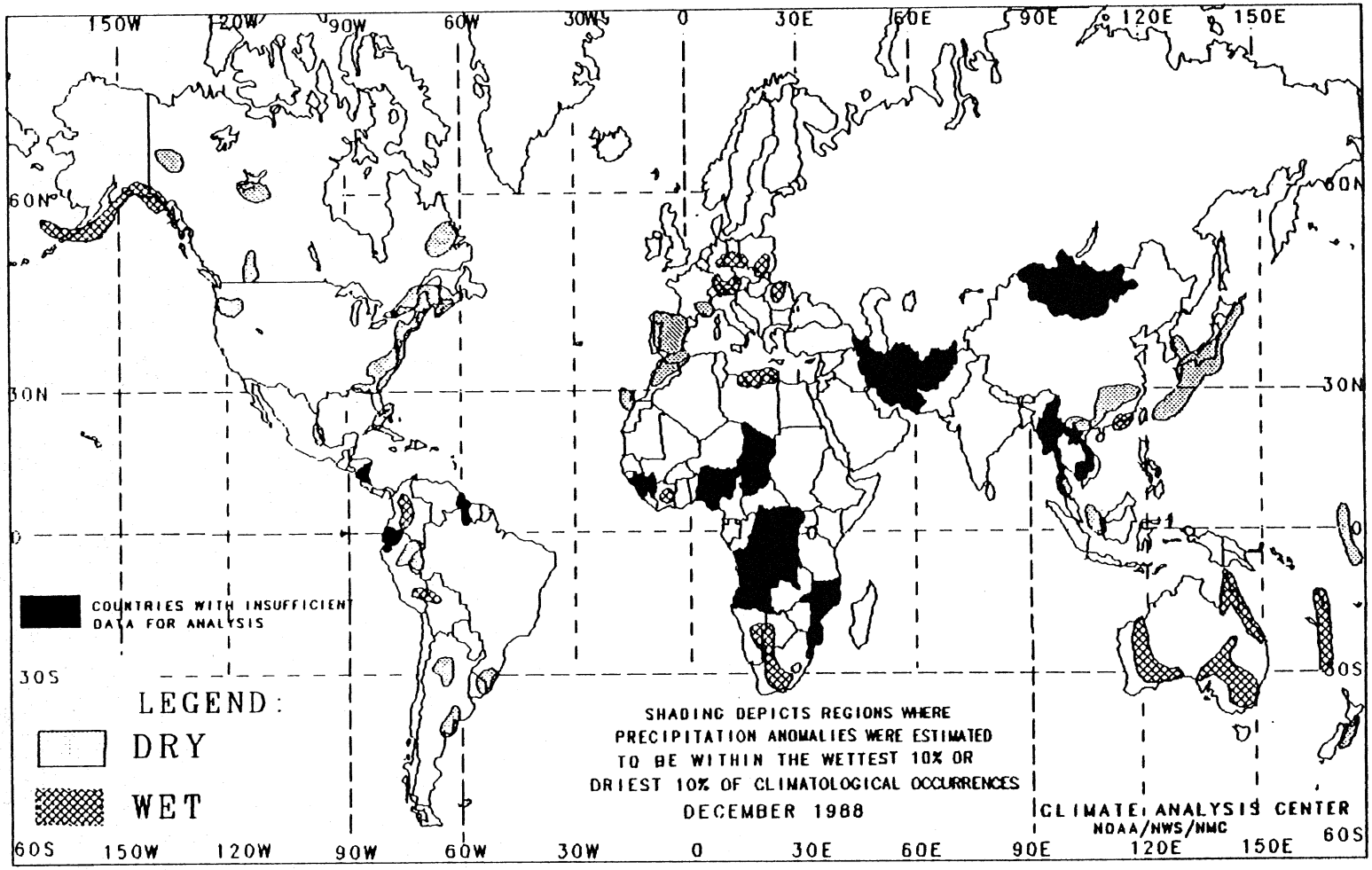
The chart shows general areas of one month temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

PRINCIPAL TEMPERATURE ANOMALIES - DECEMBER 1988

REGIONS AFFECTED	TEMPERATURE AVERAGE (C)	DEPARTURE F/NORMAL (C)	COMMENTS
Alaska and adjacent Canada	-23 to -2	+3 to +9	WARM - 4 to 22 weeks
Southeastern Oregon and Southwestern Idaho	-5 to -3	Around -3	Very cold second half of December
Southeastern Quebec and Northern Newfoundland	-24 to -18	-3 to -5	COLD - 9 weeks
Argentina and extreme Southern Brazil	+22 to +30	+2 to +4	WARM - 2 to 10 weeks
The Azores	Around +17	Around +2	Very warm first half of December
Western Europe	+3 to +10	+2 to +4	MILD - 2 to 9 weeks
Ivory Coast	+21 to +25	-2 to -3	Very cool second half of December
Pakistan and South Central Soviet Union	-8 to +14	+3 to +6	MILD - 4 to 10 weeks
Siberia	-40 to -11	+2 to +12	MILD - 4 to 22 weeks
Central China	-4 to +18	+2 to +3	MILD - 2 to 10 weeks
Western Australia	+16 to +29	-2 to -3	COOL - 2 to 10 weeks
Central New Zealand	+17 to +18	Around +2	Very warm second half of December

GLOBAL PRECIPITATION ANOMALIES

1 MONTH



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the one month period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total one month precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

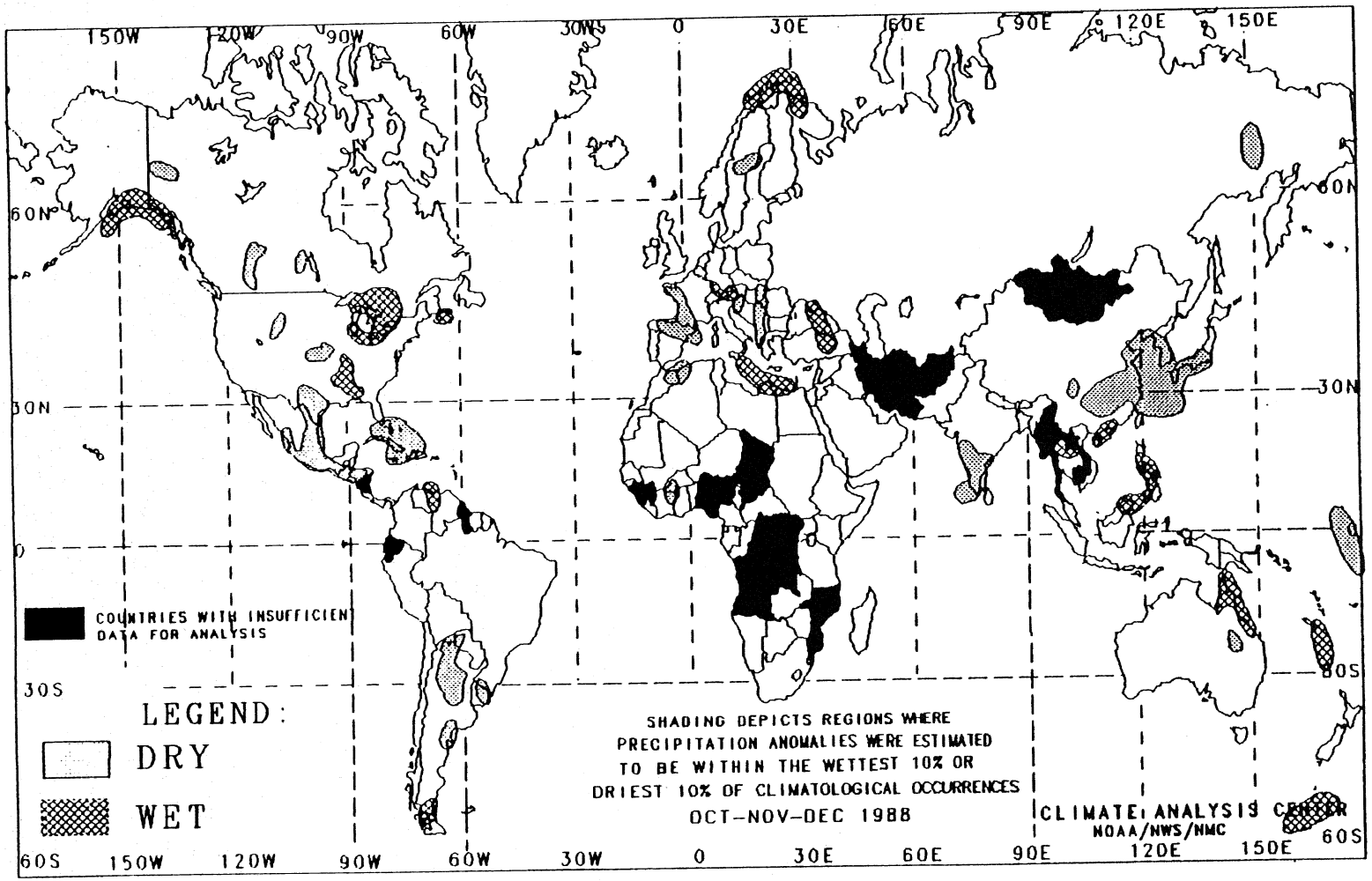
The chart shows general areas of one month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

PRINCIPAL PRECIPITATION ANOMALIES - DECEMBER 1988

REGIONS AFFECTED	PRECIPITATION TOTAL (MM)	PERCENT OF NORMAL	COMMENTS
Southern Alaska	40 to 621	129 to 283	WET - 2 to 7 weeks
West Central Yukon	0 to 5	0 to 20	DRY - 12 to 15 weeks
North Central Canada	5 to 7	22 to 27	DRY - 8 to 9 weeks
Southwestern Alberta	0 to 26	0 to 49	DRY - 14 to 22 weeks
East Central Quebec	16 to 31	31 to 41	DRY - 5 weeks
Northern Oregon	9 to 82	22 to 37	DRY - 6 to 7 weeks
Southeastern Canada and Eastern United States	0 to 75	0 to 77	DRY - 4 to 9 weeks
Southern Florida	3 to 5	7 to 11	DRY - 10 weeks
East Central Mexico	2 to 33	7 to 73	DRY - 4 weeks
West Central Colombia	118 to 293	188 to 288	Heavy precipitation early and late December
Northeastern Peru and adjacent Brazil	33 to 113	12 to 53	DRY - 9 weeks
Southeastern Peru and adjacent Bolivia	220 to 479	182 to 218	WET - 2 to 4 weeks
Northern Argentina	3 to 57	6 to 41	DRY - 6 to 29 weeks
East Central Argentina	0 to 28	0 to 39	DRY - 10 to 29 weeks
Northern Uruguay and adjacent Brazil	14 to 69	16 to 56	DRY - 7 weeks
East Germany	84 to 144	169 to 333	WET - 6 weeks
South Central Poland	58 to 90	156 to 242	Heavy precipitation first half of December
North Central Romania	45 to 90	131 to 192	Heavy precipitation first half of December
Switzerland, Austria, and West Germany	55 to 478	190 to 284	Heavy precipitation first half of December
Southeastern France	7 to 65	9 to 72	DRY - 10 to 14 weeks
Spain, Portugal, and Morocco	0 to 115	0 to 55	DRY - 5 to 10 weeks
Canary Islands	1 to 28	3 to 25	DRY - 10 weeks
Northern Libya	110 to 221	208 to 280	WET - 2 to 5 weeks
Ivory Coast	66 to 68	296 to 420	Heavy precipitation first half of December
Botswana, Namibia, and South Africa	43 to 148	181 to 630	WET - 2 to 6 weeks
Interior of Southeastern China	0 to 33	0 to 67	DRY - 6 to 10 weeks
Coast of Southeastern China	63 to 107	133 to 417	Heavy precipitation second half of December
Japan and Korea	0 to 263	0 to 80	DRY - 4 to 21 weeks
Extreme Southern Thailand	8 to 150	5 to 34	DRY - 5 weeks
Western Borneo	106 to 122	34 to 35	DRY - 6 weeks
Western Australia	52 to 119	127 to 958	WET - 2 to 10 weeks
Southeastern Australia	58 to 222	215 to 817	WET - 5 to 10 weeks
Northeastern Australia	270 to 575	156 to 291	WET - 4 to 14 weeks
Kiribati Islands	22 to 107	11 to 28	DRY - 6 to 13 weeks
New Caledonia	207 to 954	121 to 331	WET - 4 to 8 weeks
Central New Zealand	11 to 35	22 to 39	DRY - 5 to 10 weeks

GLOBAL PRECIPITATION ANOMALIES

3 Months



The anomalies on this chart are based on approximately 2500 observing stations for which at least 81 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

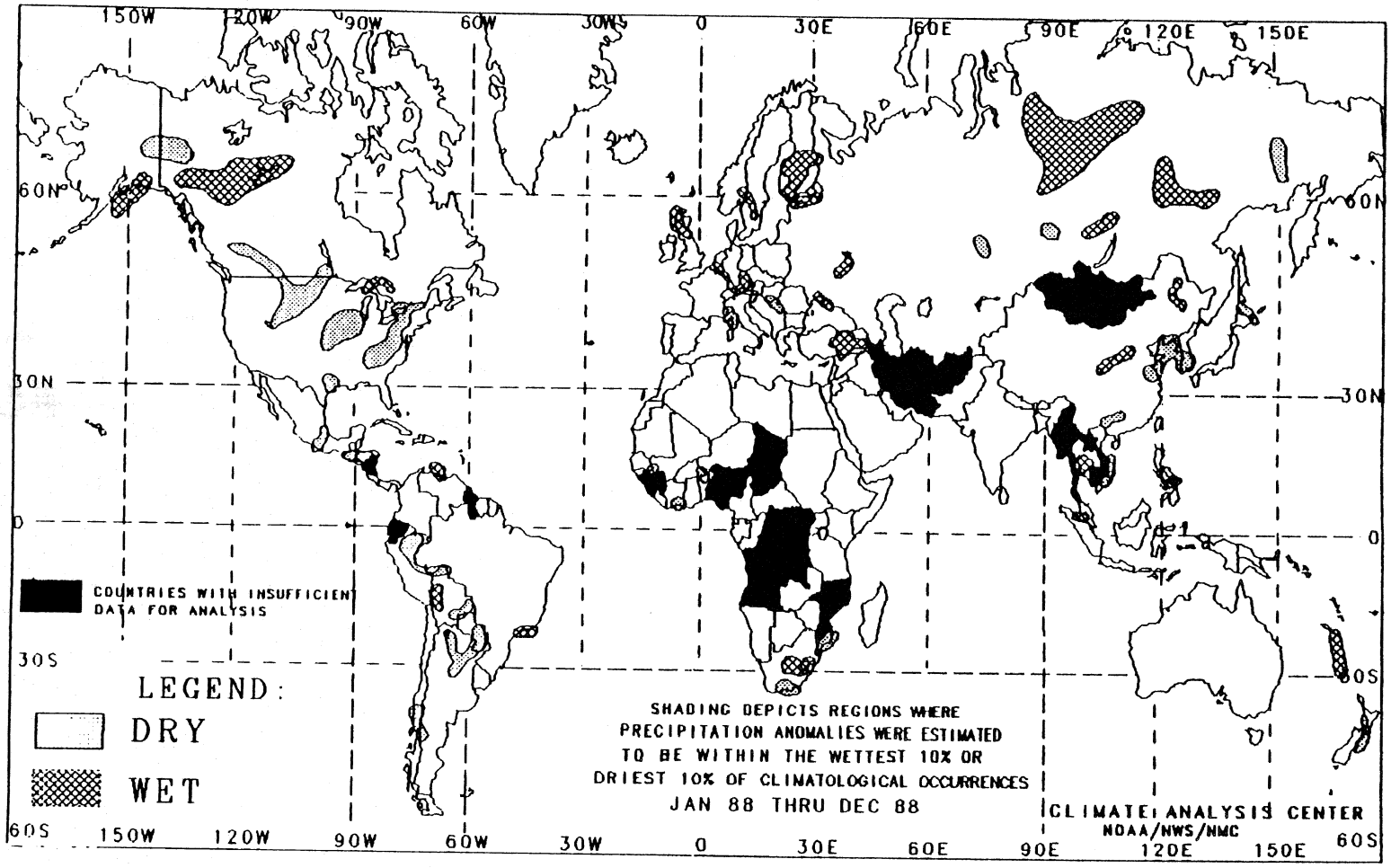
In climatologically arid regions where normal precipitation for the three month period is less than 50 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total three month precipitation exceeds 125 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, south-western Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of three month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

12 MONTHS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 350 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the twelve month period is less than 100 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total twelve month precipitation exceeds 250 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of twelve month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

CLIMATE ANALYSIS CENTER, NMC
NATIONAL WEATHER SERVICE, NOAA

MAJOR CLIMATIC EVENTS AND ANOMALIES AROUND THE WORLD IN 1988

1. United States:

DROUGHT MOST SEVERE SINCE 1936.

Major crop areas, covering over one-fourth of the lower 48 states, received less than one-half of their expected rainfall during the planting and growing periods from April through June. The driest and/or hottest periods in over 90 years were recorded in parts of the Rockies, the Great Plains, the Midwest, and the lower Mississippi Valley. The severity of the drought peaked in early July. Widespread rains during late July and August improved the short-term moisture conditions; however, several months of excess precipitation will be required to return riverflow and reservoir conditions back to normal [see Figure 1].

2. China and Taiwan:

HIGHLY VARIABLE PRECIPITATION PATTERNS DOMINATE.

Unusually dry conditions prevailed across east central China during April. In May, thunderstorms and heavy rains ended the dryness. By June dry conditions returned and spread across south central, southeastern, and east central China. Locally heavy rains began in early July; however, hot and dry weather continued in the eastern part of China. A highly variable precipitation pattern, characterized by widely scattered heavy showers, spread across most of China by late July. At the end of August, unusually wet conditions developed in southern China, then spread across central and eastern China during September and then into Taiwan by the end of the month. During the final three months of 1988, very meager rainfall (less than 50 mm) fell at stations in southeastern China. These amounts were quite low, generally less than one-half of normal, even for the normally dry autumn and early winter months (October-December). Late December heavy rains eased the dryness on the southeast coast; however, the interior remained abnormally dry [see Figure 1].

3. Equatorial Pacific:

EL NINO ENDS; HIGH INDEX PHASE TAKES OVER.

The "El Nino" pattern of anomalously warm sea surface temperatures disappeared and has since been replaced by below normal sea surface temperatures accompanied by strong easterly wind flow at the surface and strong westerly upper air (200 mb) circulation [see Figure 3].

4. South America:

DRY SINCE JUNE.

Since July (April in some areas), precipitation has been deficient in much of South America. The dry spell began in Brazil, Bolivia, and Paraguay where the normally wet spring (September to November) season had a lack of rainfall. Isolated heavy showers in late October failed to bring relief. During November and early December abnormally dry weather was limited to northern Argentina; however, dryness returned by the middle of December. Heavy rains relieved the dryness across the area except for Paraguay and parts of northern Argentina [see Figure 1].

5. United States and Canada:

REGION ENDURES HOT SPELL.

Near record-breaking high temperatures covered the northern and central portions of the United States during the summer (June-August) and much of the rest of the United States and adjacent parts of Canada experienced above normal temperatures. The warm conditions combined with a lack of rainfall to aggravate the drought. Relief, in the form of cool Canadian air, came to the region during late August after four to five months of abnormally hot weather [see Figure 3].

6. South America:

TWO COLD WAVES CHILL CONTINENT.

An extensive cold spell plagued most of the southern two-thirds of South America from the middle of May until the end of June, when low temperatures were limited to west central Bolivia. After a brief respite of near normal temperatures, cold conditions returned with freezing temperatures penetrating well north into the coffee-growing regions of Brazil. By early August the very cold conditions were limited to Bolivia and by the end of August temperatures had returned to normal [see Figure 4].

7. South Central Asia:

KAZAKH HOT AND DRY; INDIAN MONSOON BOUNTIFUL.

Very hot weather dominated south central Asia with a severe heat wave in May and June. Once the onset of the monsoon occurred, high temperatures were limited to the Kazakh and the neighboring Soviet Socialist Republics. India started out with unusually hot, dry weather, but as the monsoon rains advanced, the temperatures fell and the dryness ended. By the end of July plentiful monsoon rains covered most of northern India. Unfortunately, the anomalously heavy rains triggered flooding and mudslides. Conditions returned to near normal in the middle of August [see Figure 2].

8. Europe:

WET WEATHER FROM FEBRUARY TO APRIL.

Heavy precipitation fell across many parts of Europe from southern Scandinavia to Switzerland and Austria during late February and March. A short dry spell provided relief in early April but heavy rains returned by the middle of the month. The abnormally wet conditions ended by the first week of May [see Figure 2].

9. Scotland:

WET CONDITIONS PREVAIL.

Heavy rains at frequent intervals kept Scotland unusually wet from June through the middle of September. Short periods of dry weather provided some relief from the wet weather pattern [see Figure 2].

10. Eastern Asia:

MILD OCTOBER THROUGH DECEMBER.

Unusually mild weather was observed in southeastern Siberia, northeastern China, and Korea during October and November. In late November and early December the mild conditions were limited to southeastern Siberia. By the middle of December temperatures were well above normal across eastern Siberia, and mild weather spread westward late in the month [see Figure 3].

11. Western United States and Adjacent Canada:

YEAR OFF TO A VERY DRY START.

The Far West normally receives most of its annual precipitation during the winter months (December-February) with lesser amounts occurring in the transitional months of fall (October and November) and spring (March and April). The area had only about one-half of its expected rainfall during January and February. Precipitation remained relatively light in March but by April dryness was limited to California. Heavy rains in California during late April ended the dryness there; however, the entire region entered the dry summer season with significant precipitation deficits for the rainy season [see Figure 1].

12. Botswana, South Africa, and Zimbabwe:

TORRENTIAL RAINS OCCUR.

Very heavy precipitation fell in Botswana and Zimbabwe during February and spread into South Africa during March. Heavy showers and thunderstorms persisted until the beginning of April when drier conditions returned [see Figure 2].

13. Europe and North Africa:

VERY MILD CONDITIONS IN JANUARY AND FEBRUARY.

The first two months of 1988 were very mild across most of Europe. In early January the warmest conditions were centered over the United Kingdom and central Europe. All of Europe had above normal temperatures in January and the very warm weather spread southward to northern Africa. By the middle of February the relatively mild conditions shifted eastward but diminished by the end of the month [see Figure 3].

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14. Eastern Europe and the Middle East:

NOVEMBER AND DECEMBER VERY COLD.

Unusually low temperatures spread across much of eastern Europe during late October and early November. By the middle of November the cold weather spread to the southeast. Winter storms, with hea
high winds, hit the Alps and West Germany in late No
in early December. High winds and heavy snows struck n
the Middle East late in the month. Tempera
middle of December, and by the end of the
to Finland, Greece, and the Middle East

15. Australia:

HOT AND DRY JANUAR
The eastern two-thirds of Australia
during January and early February. In t
conditions existed but the hot and dr
month to north central Australia. Temp
March and heavy rains ended the dry spe

16. Europe and Northern Africa:

HEAT WAVES IN JULY AND AUGUST.

High temperatures dominated Europe and northern Africa in early July. Northern Africa had a brief respite from the heat in late July, but the hot weather returned in early August. Cooler conditions moved across northern Europe during the first week of August. In the middle of the month above normal temperatures were limited to southern and central Europe and the hot spell abruptly ended late in August [see Figure 3].

17. United States:

VERY DRY CONDITIONS PREVAIL.

Unusually dry conditions spread across the eastern half of the United States during February and March. By the middle of April relief came to the Northeast and the drought in the central United States (see item 1 above) had begun. Much needed rains fell across the Southeast in late April and ended the dryness there [see Figure 1].

18. Brazil:

RIO DE JANEIRO/SAO PAULO AREA AFFLICTED BY HEAVY RAINS.

Much of the coastal and mountainous regions around Rio de Janeiro experienced torrential rains during February. The distribution of rainfall was quite uneven with heavy downpours in episodes of a day or two and quiet weather in between. This pattern also affected the Sao Paulo area in March. By the end of March the regime of recurrent thunderstorms ended and drier conditions returned [see Figure 2].

19. Eastern Europe:

DRY SPELL IN MAY AND EARLY JUNE.

In early May, unusually dry conditions spread across West Germany, East Germany, Poland, Switzerland, and Austria. By the end of May the dryness covered much of central and southern Europe. In early June rains brought relief to central and southern Europe and by the middle of the month moderate rainfall ended the dry spell [see Figure 1].

20. Africa:

NEAR TO ABOVE NORMAL RAINY SEASON ACROSS SAHEL.

Heavy rainfall occurred across much of the Sahel region from Senegal eastward to Ethiopia during the rainy season (June through September). Flooding was reported in Nigeria and in the Sudan. Drainage from the torrential rains in the central Ethiopian highlands exacerbated the situation downstream in central and northern Sudan. Subnormal seasonal precipitation totals were limited to southeastern Mauritania, central Mali, southeastern Burkina Faso, and the northern parts of Togo and Benin [see Figure 2].

SIGNIFICANT BELOW NORMAL PRECIPITATION ANOMALIES

DURING 1988

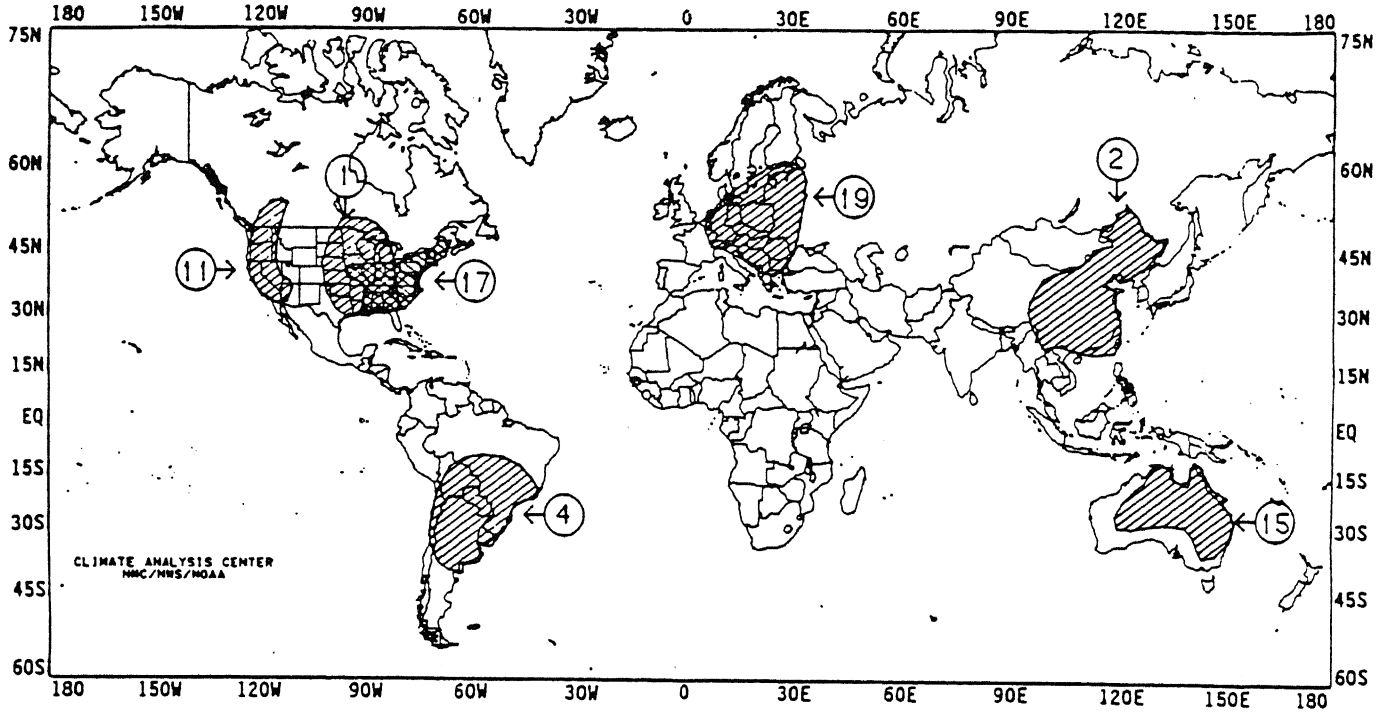

Figure 1. Significant below normal precipitation (dry) anomalies during 1988.

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DURING 1988

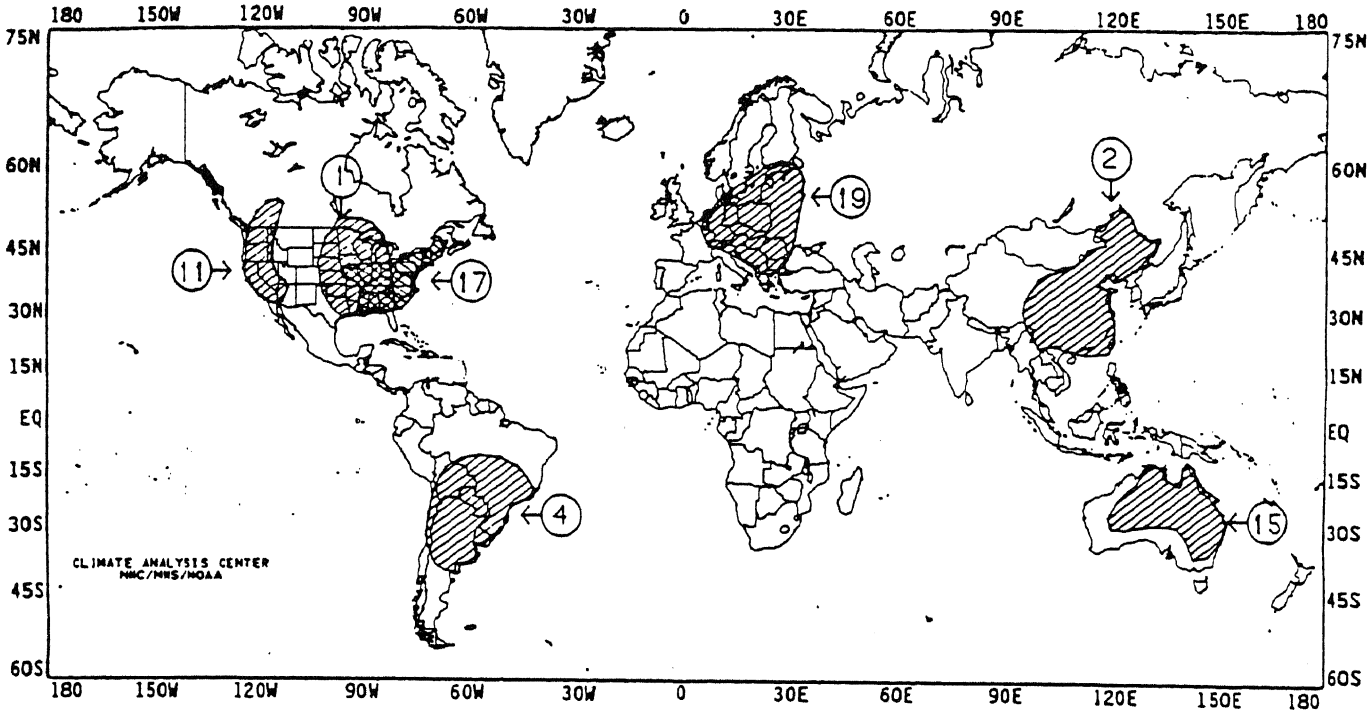

Figure 1. Significant below normal precipitation (dry) anomalies during 1988.

SIGNIFICANT ABOVE NORMAL PRECIPITATION ANOMALIES

DURING 1988

SIGNIFICANT ABOVE NORMAL TEMPERATURE ANOMALIES

DURING 1988

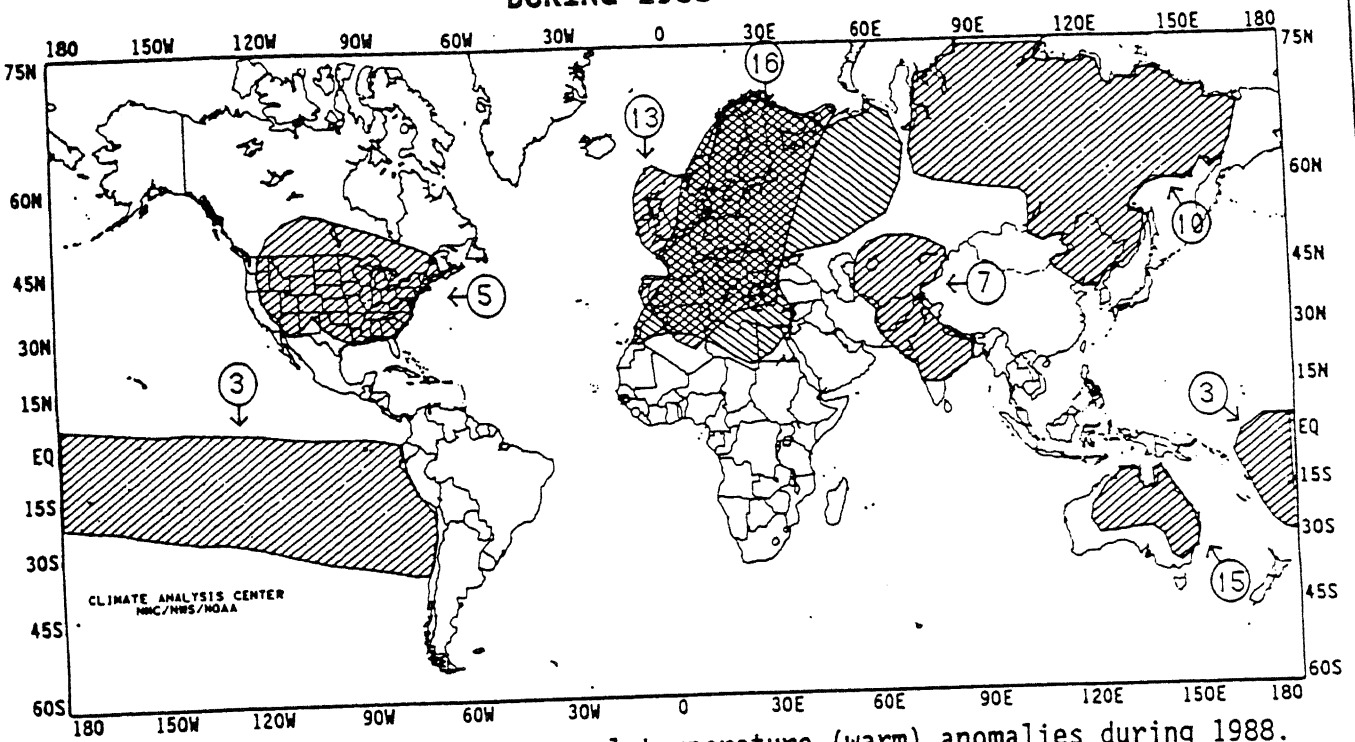

Figure 3. Significant above normal temperature (warm) anomalies during 1988.

SIGNIFICANT BELOW NORMAL TEMPERATURE ANOMALIES

DURING 1988

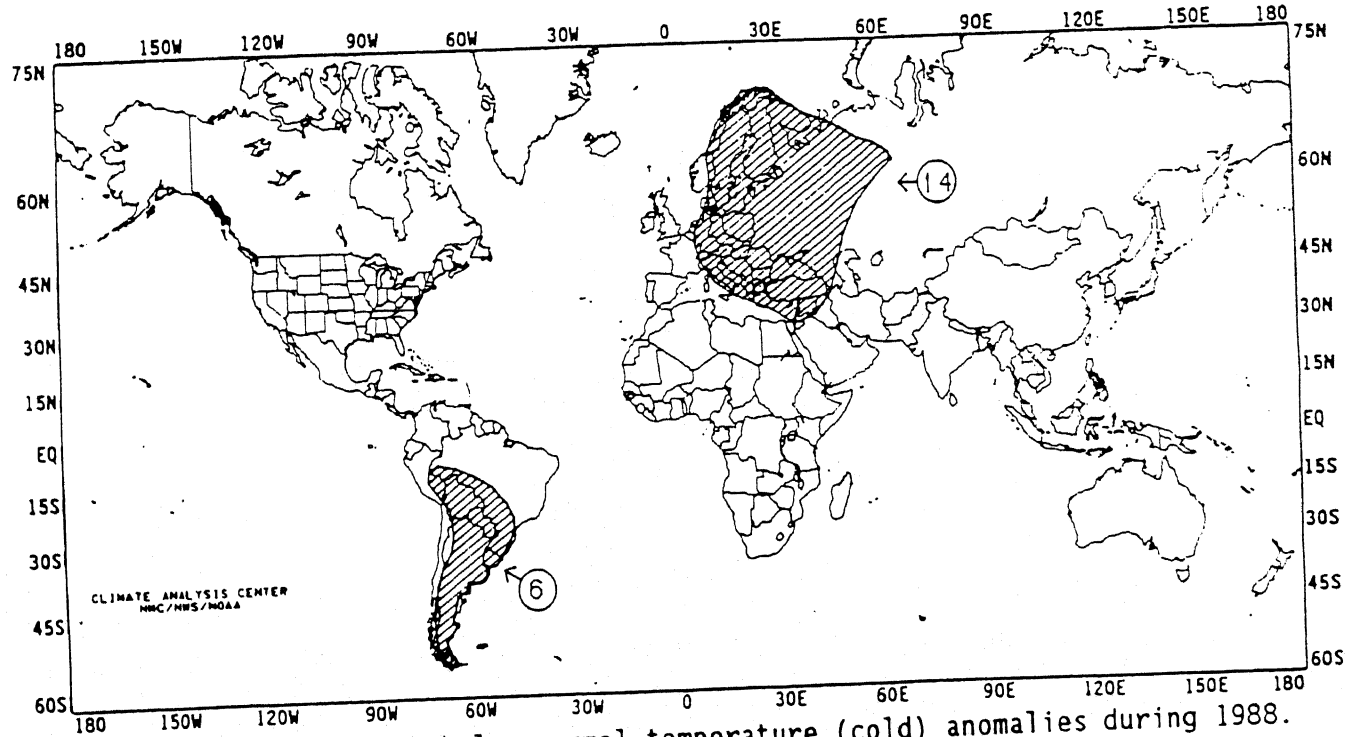

Figure 4. Significant below normal temperature (cold) anomalies during 1988.

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SIGNIFICANT CLIMATE ANOMALIES AND EPISODIC EVENTS

SIGNIFICANT CLIMATE ANOMALIES AND EPISODIC EVENTS (CONTINUED)

Numbers refer to week of publication in Bulletin.
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  - Central: 36,37,38
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  - Central: 52,53
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  - Western: 40,41,42
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- Scotland: 33,34,35,36,37,38,39
- South Africa:
  - Northern: 9*,10,11,12,13,14,15
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  - Northeastern: 46
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